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May 1988

THE MAC FLYER-For Greater Safety in MAC Air Operations

Dover Air Force Base

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TWENTY-FIRST AIR FORCE

The Dover Story
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THE MAC FLYER - For Greater Safety in MAC Air Operations

May 1988 MACSP 127-5 VOL XXXV NO. 5

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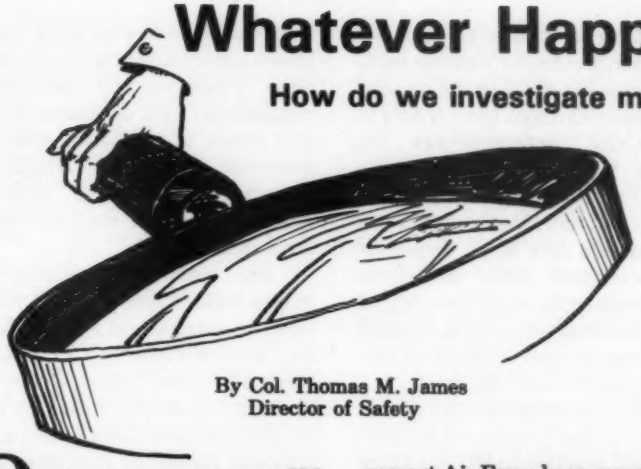
About the cover—Dover's Base Ops

Whatever Happened To . . . .

How do we investigate mishaps?



By Col. Thomas M. James
Director of Safety

During our most recent HQ MAC Safety Briefing Team "Worldwide Road Show," we discussed several mishaps and safety investigation board's (SIB) associated findings, causes, and recommendations. A frequently asked question was, "What happened to the crew, supervisor, or maintenance technician (found causal) in that mishap?" Our honest answer was, "We don't know." Although at several units we gave a fairly detailed explanation of why we safety folks don't know about resulting administrative actions or punishment, it's obvious that our rules for safety investigations are not well understood by our crew force.

To explain why we safety guys may be unaware of administrative or judicial actions taken against any person involved in a mishap, I'll discuss two types of investigations usually required following a Class A flight mishap (over $500,000 damage, a fatality, permanent total disability, or destroyed airplane), "safety investigation (AFR 127-4)" and "accident investigation (AFR 110-14)."

SAFETY INVESTIGATION

Air Force Reg 127-4, Investigating and Reporting US Air Force Mishaps, directs the nearest Air Force base commander to form an interim safety board immediately after a Class A flight mishap to preserve perishable evidence (including photographs, witness interviews, fluid samples, and tox testing IAW AFR 30-2). When the HQ MAC Directorate of Safety is notified of a mishap, we start selecting a board of trained safety investigators. CINCMAC convenes this board and selects the board president (from our list of nominees) who then works directly for CINCMAC. All board members work directly for the board president and are relieved of all other duties during the investigation. Our objective, during the selection process, is to pick the board within 3 hours and get them to the crash site within 24 hours to find out what happened, why, and how we can keep it from happening again. Obviously, if we are to prevent another mishap, time is critical.

Information derived from a safety investigation is *privileged, limited-use information.* All Air Force military and civilian personnel are prohibited from using, permitting use of, or allowing access to safety information for any purpose except mishap prevention. Furthermore, safety investigation information cannot be released outside the Air Force unless authorized by the Secretary of the Air Force. Unauthorized disclosures are punishable under the UCMJ and appropriate civilian personnel regulations. We apply this protection because safety investigators promise confidentiality to all mishap witnesses before interviews to ensure a *frank and open exchange of information.* This promise is the key to unlocking mishap causes; it is also extended to government contractors (designers, manufacturers, or maintainers), and individuals submitting rebuttals.

AFR 127-4 further stipulates safety reports and information may not be used as evidence for disciplinary action, for determining misconduct or line of duty status, as evidence before flying evaluation boards (FEB), to determine pecuniary liability, or to determine liability in claims for or against the government.

So what does all this mean to you? It means that you can talk honestly and openly to a safety investigator about a mishap, and what you say cannot be used as evidence against you in disciplinary action, FEBs, or lawsuits.

As a result, safety information may *only* be used for safety purposes. Immediately following a mishap, commanders sometimes *administratively* downgrade crew members since they can reasonably assume the individual may not be adequately trained. If the Safety Investigation Board (SIB) revealed an individual was not adequately trained, commanders could use that information to increase training requirements for that person and/or all crewmembers. If a SIB revealed an individual was suffering from a physical or medical affliction (blackouts,

epilepsy, etc.), that information could be used to require further medical evaluation for safety purposes. These actions are administrative, for bona fide flight safety purposes, and are *not* punishment.

When the SIB completes its field investigation, the board writes a final safety message and a formal report, and travels to HQ MAC to brief the MAC staff and CINCMAC.

Mishap information you receive at wing/squadron safety briefings usually comes from the final safety message. Formal report distribution is very limited and the great majority of line crewmembers will probably never see a formal report. Although the SIB's job is done, the safety process does not end with CINCMAC's briefing or formal report completion. The SIB's conclusions are in the form of findings, causes, and recommendations. Although our boards do an absolutely outstanding job, they are time-constrained to do an extremely complex and difficult task in only 30 days. After the board publishes and distributes its final report, the review process begins. Each individual found causal in the report can review the report and submit a rebuttal designed to ensure all factors relating to the mishap are fully evaluated in the interest of mishap prevention. Each organization in the chain of command, or named as office of primary responsibility for a recommendation, can review the report and agree or disagree with each finding or recommendation. For example, MAC has investigation responsibility for MAC-gained Air Reserve Forces. So, if an ANG C-130/C-5/H-3, etc., or AFRES C-130/C-141/C-5 crashes, we investigate, but both the unit involved and owning command can also comment. AFLC comments on logistics causes/recommendations, AFCC for air traffic control, Air Weather Service for weather related causes, etc. Organizations send comments through their NAFs to MAJCOM headquarters for review. We at HQ MAC send the formal report, wing and NAF positions and individual rebuttals to appropriate HQ MAC Deputate Chiefs of Staff. After we receive their comments, we prepare a final MAC position and send it for staff coordination and command section approval and signature.

After command section (usually Chief of Staff) approval, we send the MAC position to HQ Air Force Inspection and Safety Center (AFISC). AFISC reviews all involved MAJCOM positions (MAC, AFRES, ANG, AFLC, AFCC, AWS, etc.) and hammers out the final *Air Force* position.

You probably won't hear about the final Air Force position unless your wing was the mishap unit and findings and causes were controversial. Most of the time, the SIB identifies findings and causes and makes good, solid recommendations. But sometimes, we don't have universal agreement on what happened and why. *You* get briefed only on the SIB's conclusions, but what you may not know is a lot of folks at wing, NAF, HQ MAC, and other MAJCOMs may not agree. All positions are carefully studied and weighed to come to a MAC position, and, finally, an Air Force position.

Our discussion to this point has dealt with investigating and reporting *mishaps*. But the safety process is still far from over. When we've nailed down mishap findings, causes, and recommendations, we still have to *fix* the problems. Some problems are fixed within days or even hours of discovery. During the course of investigation, the SIB may discover tech data or procedural problems that can be corrected with emergency safety supplements or message changes to command regulations. And, occasionally, entire fleets of airplanes may be grounded while our MAC logistics experts and AFLC system managers sort out structural/systems problems.

But most recommendations take a little longer. Several years ago, we established a MAC Mishap Review Panel (MRP) to keep track of actions taken to correct problems identified in Class A and B, (and selected Class C and high accident potential) mishaps. The MRP is made up of MAC Directorate colonels from Aircrew Standardization and Evaluation; Aircrew Training; Maintenance and Engineering; Medical Services; Operational Requirements; Directorate of Safety, etc.), is chaired by MAC Inspector General, and meets quarterly to review progress on recommendations. Our staff OPR coordinates with non MAC OPRs. The MRP also considers recommendations in light of changing equipment needs and tight budgets. It may not make sense to make expensive changes on airplanes scheduled for early retirement. Some new system recommendations are good ideas but so expensive that we don't have enough money to design, procure, install, and maintain them.

After the MRP has finished its quarterly review, the senior MAC staff and CINCMAC review recommendation status and either approve MRP suggested actions or give us additional guidance.

Action on a mishap is not complete until action on every recommendation is reviewed and approved by the HQ MAC command section. We then pass recommendation status to HQ AFISC who also monitors each recommendation.

Although this is a long process, with some opportunity for individuals to pursue vested interests, I have observed that the process is worked with great energy and integrity. Each person involved in the review process, from unit level to HQ Air Force, has the same goal: explain what *really* happened, *why*, and *how* to prevent another mishap.

ACCIDENT INVESTIGATION

This is the second type investigation following a mishap. The NAF commander may convene an accident investigation board under AFR 110-14 if claims against the US government exceed $50,000, there was a fatality or permanent disability in the mishap, or there is a possibility of litigation against the government. This investigation serves litigation, claims, and disciplinary or adverse administrative needs of the Air Force. Accident investigators work independently of safety investigations. Safety investigators turn over certain *factual* information (wreckage, aircraft records, personnel records, mortuary or pathology reports, etc.) but *may not* give any privileged information to AFR 110-14 investigators.

The accident board is usually convened about 2 weeks after the safety board. This timing provides some overlap between them so the safety board can turn over aircraft wreckage and factual information to the accident board, but this timing avoids conflict as much as possible during field investigation. When the board has completed its field investigation, they submit their final report to the NAF commander. Adverse administrative or disciplinary actions may be directed by the NAF commander through the chain of command and judge advocate channels. These actions are not publicized like the results of the safety SIB although the report is releasable under the Freedom of Information Act. Consequently, they are not common knowledge for the crew force at large. We in HQ MAC safety don't see AFR 110-14 reports and don't receive or seek information on punishment or adverse administrative action stemming from them.

WING COMMANDER'S IN-PERSON BRIEFING

The final HQ MAC formal requirement is for the mishap wing commander to brief CINCMAC within ten days of completion of the AFR 110-14 accident investigation. The wing commander's briefing to CINCMAC is attended only by a few of the most senior officers of this command including the mishap NAF commander, vice-CINCMAC, HQ MAC chief of staff, DO, LG, XP, and IG. Other senior officers attend at CINCMAC's request. The wing commander discusses his views on what happened, why, and what he has done or will do to preclude recurrence. Although this briefing may not be purely "safety," the privileged status of safety information applies. That is, no individual can be punished based on information contained in safety reports. On the other hand, AFR 110-14 report information can be used for punishment, and the wing or NAF commander could brief CINCMAC on their intentions/actions. Likewise, CINCMAC or subordinate commanders could discuss administrative changes in jobs or assignments based on the mishap report.

In order to help you distinguish characteristics of these two types of investigations, I've included the following chart. I hope you now understand that confidentiality of safety investigations is a very special characteristic, worthy of protection under FOUO, privileged, and limited-use status. ★

Class A Mishap

Convened By	CINCMAC	NAF/CC
	Safety Board (AFR 127-4)	Accident Board (AFR 110-14)
Required for fatal mishap	Yes	Yes
Promise of confidentiality	Yes	No
Sworn witness statements	No	Yes
Executive privilege	Yes	No
Releasable under FOIA	No	Yes
Usable for disciplinary action	No	Yes
Usable for litigation	No	Yes
Usable for adverse admin action	No	Yes
Usable only for safety	Yes	No
Protects contractors assisting the board	Yes	No

Flying-Hour Milestones

7,500

Maj. Gen. James E. McAdoo
Maj. Gen. Thomas P. Webb, III.
Brig. Gen. William W. Basnett
Brig. Gen. Theodore F. Lowe, Jr.
Col. James D. Copenhaver
Col. Kenneth O. Gabriel
Col. Thomas R. Harding
Col. William A. Treu
Lt. Col. Thomas P. Beal
Lt. Col. Fred F. Castle
Lt. Col. David F. Deterich
Lt. Col. Carl C. Firkins
Lt. Col. Gale E. French
Lt. Col. Charles J. Haller
Lt. Col. Christopher J. Joniec
Lt. Col. Dennis M. Jorgenson
Lt. Col. Emeric T. Szappanos
Lt. Col. William C. Schillig
Lt. Col. Lee T. Weiland, Jr.
Maj. David Lee
Maj. George K. Pickler, III.
Maj. Thomas C. W. Keitel
Maj. Charles W. Ware, Jr.
Maj. Elmer S. Whittier
CMSgt. Randolph T. Turck
SMSgt. Richard N. Guthrie
SMSgt. Douglass R. Moshier
SMSgt. Thomas E. Templeton
MSgt. Frederick Allard
MSgt. Thomas G. Durkin
MSgt. Bruce Ferguson
MSgt. Joseph E. Gaudet
MSgt. Lawrence G. Halter
MSgt. Rudolpho P. Irizarry
MSgt. Fredrick R. Samer
MSgt. Bertrand J. Paradis
MSgt. Richard A. Rehnberg
MSgt. Robert A. Whitman

5,000

Col. Ralph H. Oats
Lt. Col. Gary Clark
Lt. Col. Gary A. Graves
Maj. Paul E. Davenport
Maj. Bernard J. Ferro
Maj. Lawrence E. Merker
Maj. John E. Riley

2,500

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Col. William F. Haber
Col. Samuel P. Mitchel
Col. Donald E. Sklenar
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Lt. Col. Robert L. Biehunko
Lt. Col. Kenneth M. Bodner
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Lt. Col. Fred F. Castle
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Maj. Stephen D. Cotter
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Maj. Merril N. Cross
Maj. Robert L. Cuddeback
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Maj. James M. Doran
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Maj. David E. Doyle
Maj. Nelson W. Dwight, Jr.
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SMSgt. Stanley A. Marzec
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MSgt. Earl A. Huskamp
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MSgt. William L. Wilmer
MSgt. Earl W. Winterstein, III.
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TSgt. Henry M. Olearcek
TSgt. Fred W. Perret
TSgt. Ronald J. Robbins
TSgt. Melvin J. Roberts
TSgt. Allen L. Scheel
TSgt. Robert T. Steely
TSgt. Bruce W. Szepelak
TSgt. Richard W. Turpin
SSgt. Lawrence A. Ciprane
SSgt. John T. Hurst
SSgt. Leslie K. O'Roke
Sgt. Jose V. Fowler

1,000

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SSgt. Billy T. Breedlove
SSgt. Marcus A. Castro
SSgt. Richard W. Davin
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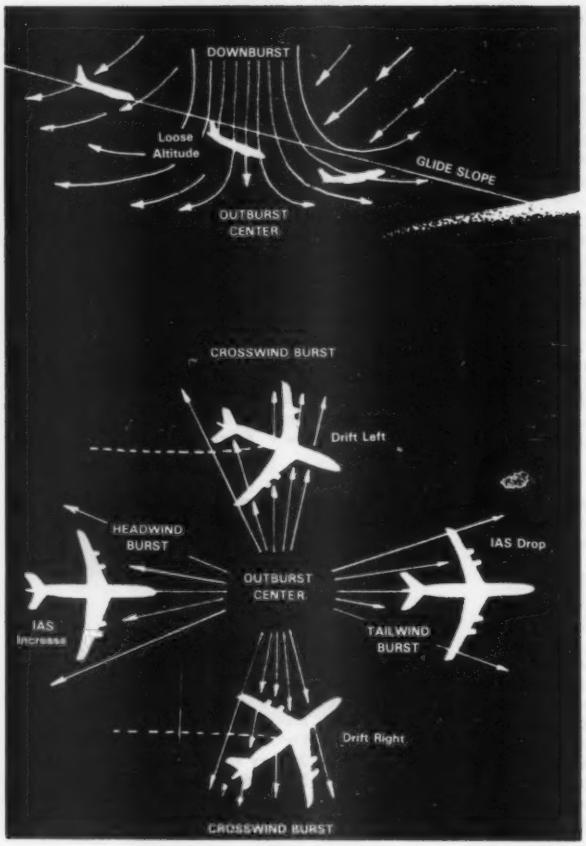
Sgt. David M. Dean
Sgt. William H. Taylor
Sgt. Kevin R. Kempke

Ranks and units are those at time of award. ★

The most dreaded form of windshear . . .

SHEAR SURPRISE



NASA's Aviation Safety Reporting System (ASRS) is a valuable source of reports from pilots and controllers on incidents involving flight safety and air traffic control problems. Occasionally, however, they get a report that could truly be called a "classic." This kind of report contains every ingredient of good reading: drama, meticulous attention to detail, and implicit safety lessons for every pilot. One such report was submitted recently. It's a first officer's (copilot) account of an air carrier's encounter with the most dreaded form of wind shear, *the microburst*. In addition to its many other merits, this report offers a needed (and solemn) reminder that in spite of everything technology can do to make weather predictable and avoidable, the elements can surprise—sometimes fatally.

The report follows ASRS conventions of confidentiality—identifying names were removed and runway orientation is described as North (NO) or Southwest (SW) instead of more specific compass reference. For those mystified by some of the air carrier acronyms scattered throughout the report, the following clarifications might help: EHSI is Electronic Horizontal Situation Indicator; ADI is Attitude Director Indicator; GPWS is Ground Proximity Warning System; and IVSI is Instantaneous Vertical Speed Indicator. The peak thunderstorm season is upon us, so read carefully:

"Approaching from the west, we observed, visually and on radar, an extensive area of scattered thunderstorm cells in the vicinity of the airport. The area extended from west/southwest of the airport to the south. Once handed over to Approach we were able to make extensive visual deviations around cells and remain in the clear. ILS approaches were in progress to runways NO-L and NO-R, although the ATIS reported NO-R closed. The weather at the airport was 92 degrees F, ceiling 4,000 ft broken, visibility 4 miles in haze, wind from the south at 8

knots. As we continued our descent into the airport we were in the top of the haze at 8,000 ft and were then relying exclusively on radar to avoid cells. The ride was smooth until below 4,000 ft where we were in continuous light chop. There was extensive discussion between ourselves and Approach regarding which runway we were being vectored to. It switched between NO-L and NO-R twice, with us finally flying a west downwind to NO- L. I was flying the aircraft with the autothrottle/autopilot engaged using flight level change and heading select modes. We had another pilot in the cockpit jumpseat and the captain had him call tower while we were being vectored, to get the most current field conditions. Tower reported throughout the incident that the field was "in the clear." Both the captain and I had our EHSIs selected to the map mode with WX radar display in addition to the dedicated weather radar display between us. We agreed to fly the approach at a faster than normal airspeed, and the airspeed bug was set to 140 knots ($V_{AP}+10$) rather than 126 knots ($V_{TH}+5$) as per normal procedures. We were vectored and joined the NO-L localizer about 3 miles from the outer marker.

Approaching the outer marker, we captured the glideslope and were established in the landing configuration, gear down/flaps 25 degrees. At that point I told the captain I was going to manual flight, disconnected the autothrottle and autopilot and flew referenced to the flight director/raw data on the ADI. As we passed over the outer marker, tower cleared us to land NO-L, reference traffic on short final. We queried tower as to weather conditions and they responded the field was in the clear, although there was lightning to the southeast. Tower asked the airplane in front of us if it had encountered any wind shear. They made an indecisive response which we interpreted as a negative.

At approximately 3 miles on final, we were approaching a pronounced rain shaft on localizer/on glideslope. Before entering the rain, our indicated airspeed increased (over a one to two second interval) from 140 to 185 knots. We began to get above the glideslope as we entered the rain. Shortly after entering the rain shaft, we had an instantaneous indicated airspeed decay from 185 knots to 120 knots. (I cannot overemphasize the rapidity with which it moved!) I applied maximum thrust (levers to forward limits), called for flaps 15 degrees, and attempted to maintain altitude. The captain raised the gear, selected 15 degrees flaps, and called missed approach. We got a momentary configuration warning (gear not down/flaps beyond 20 degrees). I don't believe the GPWS ever sounded. The captain observed the altitude decrease to 1,200 ft MSL (approach end NO-L 639 ft elevation). He was also closely monitoring the IVSI during the recovery. We exited the northeast side of the rain shaft slightly offset to the right of runway centerline beyond the approach end of NO-L. The captain gave a very explicit warning to the tower regarding the area we had transited. The aircraft behind us (another carrier) abandoned the approach when we called missed approach. We were handed back to approach who gave us instructions to the VOR to hold. Approach advised they were changing to runway SW approaches and that we could expect vectors for an ILS. From what we could see, there was a large cell sitting on the south portion of the airport and we decided to divert."

. . . It seemed we were in this situation for a 'long time.'

The pilot concludes the narrative with further observations on those harrowing seconds between application of full thrust and the airplane's exit from the rain shaft:

"My perception of the elapsed time once we encountered the airspeed loss is slightly skewed. With maximum power, flaps 15 degrees, and gear up, we were descending at approximately 400 ft per minute. It seemed we were in this situation for a 'long time.' With hindsight, it was probably between 5 and 10 seconds until we exited, but I can't be any more explicit. I had expressed my reservations about the approach to the captain before we crossed the outer marker, although not as forcefully as I should have. We discussed the incident at length, later that evening, and were both convinced that during the encounter an uncontrolled impact with the ground was imminent and *was going to happen*. I will strive to avoid similar circumstances for the rest of my career." ✈

Adapted From *NASA's CALLBACK*

Starlifter Follies

Here's one that'll turn your knuckles white!

By Maj. Stephens F. McCauley
Associate Editor

Greetings! Stan Muldoon, aviation safety reporter, on your freq again. Heard any good ones lately? Well, here's one that'll turn your knuckles white even as you sit in your favorite living room chair. So, for you daring darlings of the airways who think you're immune to the old "pucker factor," read on!

My story this month focuses on a friend of mine, "Fearless" Frank. Well, at least he *used* to think he was fearless. Fortunately, he survived yesterday's airlift adventure and says he's reformed. With any luck, the impression will last.

We're in base ops at Grissom AFB. Frank stares through the large windows into the bright glare

reflecting off the snow-covered infield between ramp and runway. Weather outside is severe clear, calm, and just above freezing. I encourage Frank with, "Confession is good for the soul, pardner. Tell me about what had you so wrung out when you diverted in here yesterday?"

Frank's voice sounds uncharacteristically humble as he murmurs, "Amazing how sunny and fresh the world looks after a blizzard passes through. Yesterday could have been my last flight. I did hear that 'little voice' in my head, and it nearly screamed at me when I refused to heed the warning.

"Guess I let my ego, instead of better judgment, run the mission. But I'd flown in bad weather lots of times. With a couple thousand hours flight time, there'd been plenty of chances to screw up. My experience had engendered a rather arrogant attitude towards weather: It's never going to be as bad as the forecaster predicts since he usually presents the 'worst case' story. Well, flying small aircraft to published mins in pea soup fog, or C-141 CAT II approaches in heavy rain never really presented much of a problem. Relatively new to the C-141 and 'Big MAC,' I put the finishing touches on my upgrade to aircraft commander last week with an overseas buddy ride mission. I eagerly charged out on my very first mission yesterday as a fully certified aircraft commander. The loaner copilot, from another squadron, was also a captain, though newly arrived at his first assignment following UPT. He had his dollar ride just last week. I was impressed by his bearing and approach to airmanship tasks. A very sharp professional in spite of his low experience level.

"Our mission sounded simple: Fly our empty Starlifter to K. I. Sawyer, pick up and deploy a unit to Florida for the month of February."

"Oh, right," I interject. "South for the winter."

"Sure, I guess. Well, we were the first of four aircraft—all scheduled to depart home station between 0700 and 0800 local. The controller at wing command post told us a winter storm front was moving across the midwest and great lakes region. K. I. Sawyer was currently below IFR mins, but *scheduled* to improve. He further advised we had only ramp fuel load, since we had no cargo for the positioning leg.

"The flavor of the mission continued to change as we visited the weather shop; the forecast didn't show improvement at destination for about six hours. I was about to suggest to the command post duty officer that we weather delay our mission when I overheard a couple of other pilots from another crew assessing the situation. They seemed to be in the press on mode. I reasoned that permissibility is implied, since MACR 55-141 explains you need two alternates to file to a destination forecast below mins. It must be part of the Big MAC routine—avoid alibis for late departures. When it was my turn at the window again, I decided to ask for extra fuel for a more distant alternate, extra holding, icing, TS avoidance, etc . . . I was suprised when command post balked, so I defended my request with MACR 55-141, 6-21b: 'The aircraft commander retains final authority in the choice of alternate.' They immediately countered with more from MACR 55-141, 6-21b: 'However, selection (of an alternate) by support agencies normally should be used if they meet the above (fuel conservation) criteria and the aircraft has already been serviced.'

"I finally sniveled another 10,000 pounds out of them, however. The copilot checked out the pubs kit while I filed the flight plan. We headed for the aircraft to reunite with our reservist flight engineers. They hit a snag while preflighting the T-tail deicing system, so I suggested they ignore that little defect and complete the preflight. We could run late because of the extra fuel being loaded. Then, close to scheduled takeoff time, the INS didn't like the present position the copilot had inserted. Our only recourse was to shut them down and start over. We would load the remaining waypoints once airborne. Rushing through the checklists, we did avoid a late departure—but by less than one minute.

"The hour en route passed too quickly. I thoroughly briefed the 'Runway 1 ILS' approach, anticipating visibility would improve. About 35 minutes out, the copilot called K. I. Sawyer Metro and they said to stand by for a new observation. Center said to expect the ILS and asked if we could start descent. The copilot acknowledged the clearance to 15,000 and started down. Having been 'VMC above' we entered clouds at 30,000 feet. I called for the anti-ice systems and Descent Checklist just as Metro returned our call. The flight engineer pointed out number 2 engine anti-ice had malfunctioned so I had Metro stand by and asked the engineer to troubleshoot. I mentioned a vague recollection that either the engine inlet lips or the bullet nose might still be working, even though the indicator light was dark. The engineer offered to troubleshoot using circuit breakers, but I said to wait until we got on the ground. I had the scanner position himself to monitor potential engine ice build up and I recovered to 15,000 ft from an inadvertent 100 ft overshoot.

"Things were happening quickly now. I told the copilot to ask for holding instructions while I talked to Metro. The duty observer said ceiling was obscured with blowing snow; ⅛ mile vis with wind 16

gust 20 from 240, and RCR 8. I asked the engineer to check the One-Dash-One for RCR limits, and he said we'd be legal. He didn't sound too certain though, so I had the scanner doublecheck. He reported we'd be marginally legal, provided we used Runway 19.

"The Starlifter behind us also entered holding and was talking to RAPCON. The controller gave them 1800 RVR and they said they'd need 2400. After a slight delay, the controller accommodated with an updated 2400 RVR call. We'd already held for 15 minutes, so I was recalculating our fuel consumption

. . . He used to think he was fearless. . .

and divert options. I felt my reputation as a 'can do' pilot was on the line, especially when the third C-141 entered the holding stack. I'd be embarrassed if I diverted without even a try while they made it in.

"My snap judgment to accept RAPCON's offer of a PAR to Runway 19 seemed appropriate. I quickly reset my altitude marker from the 1380 ft (Rwy 1 ILS) minimum to the 1320 ft (Rwy 19 PAR) decision height given by the controller, and emphasized the importance of altitude warning calls to the copilot. We feverishly copied the litany of lost comm and missed approach instructions as we began the approach. All eyes strained to look for the ground through the white glare of blowing snow. The female controller's voice was calm, even at 300 ft above decision height when she said, 'slightly left of course, going well above glidepath.' I advanced power and called 'missed approach.' The controller automatically vectored us into a box pattern for another try. Pride struggled with anxiety as I admonished myself not to botch the second chance. Carefully concentrating on the controller's instructions, I had us on glide path and only slightly right of course at 250 ft above decision height. The scanner was leaning forward, trying to find an airfield out there.

"Suddenly, the copilot said, 'INS groundspeed—15 knots difference.' The windshear was a new factor. Momentarily confused about the proper control response, I pushed the throttles forward and called 'missed approach' again. It had been a valiant attempt. The mild embarrassment was lessened when the controller announced new RVR of 1200, well below mins for us or any of the aircraft circling above. With a sigh of relief, I requested an initial vector to our alternate. Center reported our alternate below IFR mins, but suggested we go to Grissom AFB. Bless their helping hands when you really need them. It'd be tight, but there was still enough fuel to make it.

"It struck me as odd that I was soaked with sweat while there was a blizzard swirling on the windscreen before us. Glancing around the cockpit, I noticed the copilot's command marker. It was set at 1520, 200 ft above mine. I rechecked the *single* approach plate we'd been sharing and noted the 1320 published decision height. It was listed as only 100 ft above touchdown! I felt sick. Had I continued to the controller-directed decision height, we would have blasted right through MACR 55-141 PAR mins. An F.E.B. might have awaited our return. Worse still, I could have killed my crew and myself. All for the sake of foolish pride! And what about that RCR? I'd never landed a 141 on a slick runway with gusting crosswind. I was in way over my head through the whole mission. There were some fortunate breaks in the potentially disastrous chain of events which saved us. I remembered the misplaced bravado in the motto: 'I'd rather be lucky than good.' That phrase could certainly stand some reevaluation, Stan. I think I may have used up all my luck yesterday."

"Yep," I respond. "Being extra good at what you do is the key to survival. Longevity smiles only on those who make their own luck. So, Frank, what do you think *really* went wrong?"

"Well, it must've started back in the briefing room. I let my ego set the stage for external factors (ie. weather, RAPCON, other crews, command post) to drive the mission, rather than making my own decisions based upon safety and optimum mission effectiveness. With concentration focused only upon landing at destination, other details led to task saturation and confusion in the cockpit."

"Fortunately," I conclude for him, "your ultimate decision to divert was a good one. Thanks for sharing your story, Frank."

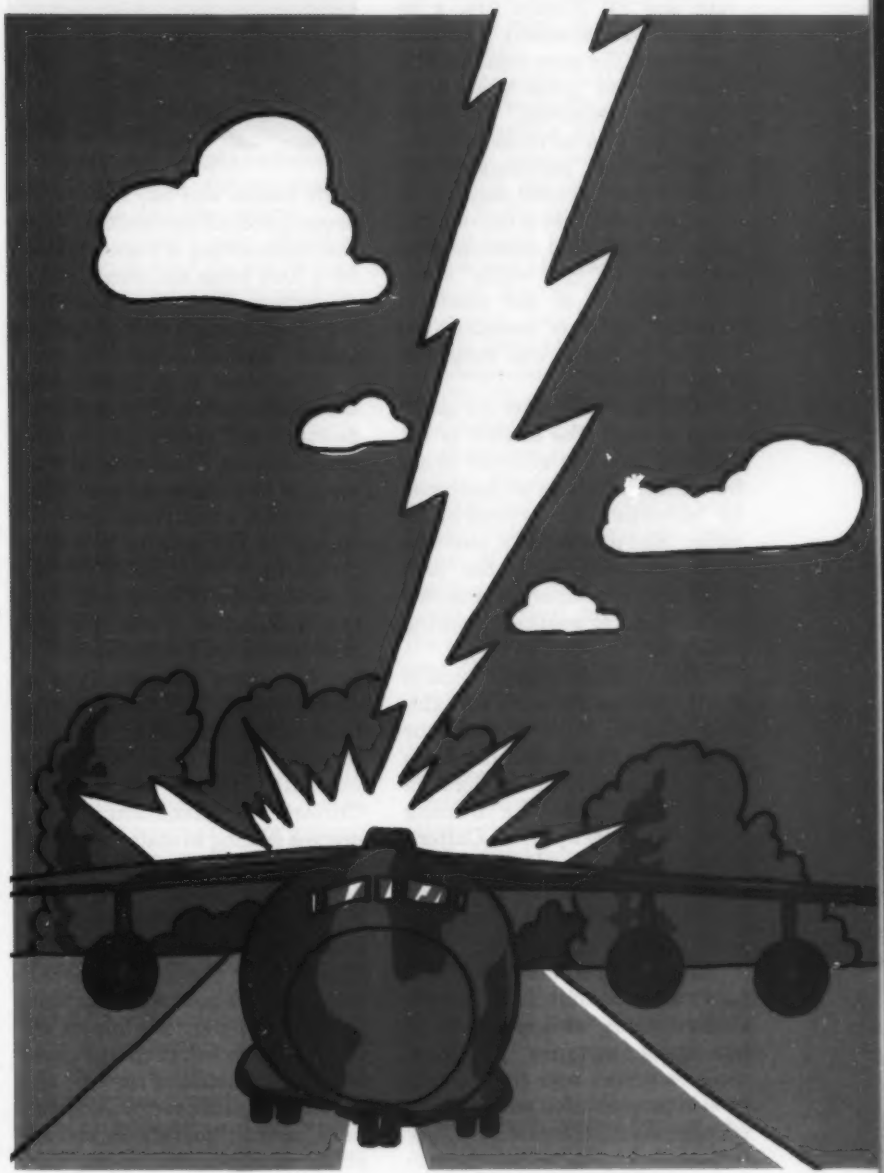
Now, for all you intrepid airlifters out there with a story just burning to be told—give me a call. We'll tell it together.

Until next time—this has been Stan Muldoon wishing you safe skies and mission success! ★

It Came from Nowhere! . . . or Aircraft-Triggered

What are your chances?

By Maj. Larry Lindsay
HQ MAC/IGFF



How likely is your aircraft to be damaged by lightning? Considering only 65—reported strikes with damage to MAC aircraft occurred in the last five years, the odds are certainly on your side. But, is there something you can do to avoid the chance of a strike? The answer is yes . . . and no.

In most incidents, the crew just got a big surprise and landed safely with minor damage, usually a small hole in the radome. However, a C-130 was destroyed several years ago when lightning ignited fuel vapors and the resulting explosion separated one of the aircraft's wings. C-130 crewmembers may rest assured modifications made since that crash will prevent a similar strike from having such a disastrous result.

Since all of us follow thunderstorm avoidance rules, why do these strikes occur? Is there such a thing as a "bolt from the blue?"

Because MAC pilots give thunderstorms wide clearance, most damaging electrical discharges aren't natural lightning bolts generated by thunderstorms. Instead, most MAC incidents fit descriptions of aircraft-triggered "static discharges."

"A bright flash of light and a loud 'boom' similar to a cannon going off" was how a C-5 crew described a discharge they encountered while descending to land at a European base recently. Flying at 10,000 ft, the airplane entered IMC and encountered very light, steady turbulence seconds before the strike. Immediately after the discharge, the crew noted light rain and St. Elmo's fire, a luminous, low intensity electrical discharge. The crew described St. Elmo's fire as "green waves dancing on the windscreen," which continued for two to three minutes. After landing, maintenance discovered over $50,000 damage including a small hole in the radome, some aircraft skin delamination, and over 100 "spot welds" along the underside of the fuselage. Weather analysis revealed the OAT at 10,000 ft was about +1 degree Celsius.

Did this C-5 crew do something wrong? The answer is no, since the crew was well over 20 nm from thunderstorms as confirmed by airborne and ground-based radar. Radar was only painting light precipitation in the area where they encountered the strike; not the kind of weather requiring avoidance.

This example is very typical of MAC mishaps reported as lightning strikes. Most don't occur while flying near a thunderstorm but are associated with flight in precipitation near the freezing level. An article by D. W. Clifford of McDonnell Aircraft Company, entitled "Another Look at Aircraft-Triggered Lightning," describes this phenomena.

Describing experiences of military and commercial pilots, Clifford states "strikes usually fit into one of two types." The most common occurs near the freezing level in precipitation not associated with thunderstorms, and may be preceded by static noise on aircraft radios and St. Elmo's fire around aircraft extremities. When the strike occurs, it's accompanied by a loud bang and does little or no damage. Typically, a small hole is burned through the radome and some delamination occurs.

The other type of discharge occurs abruptly in or near a thunderstorm and usually causes more severe damage. This type is what most of us picture as a true lightning strike, where the aircraft was simply in the way of a bolt of lightning. Fortunately, we experience few of these in MAC or the commercial world; we give thunderstorms a wide berth.

The more common type of electrical discharge, often referred to as "static discharge," is harder to avoid since it occurs in areas we normally think of as safe. Clifford's explanation of the process leading to static discharge isn't light reading, but we'll try to hit the high points.

Aircraft static charge accumulates through a process called triboelectric charging. This exchange of charge is produced when precipitation particles impact aircraft. The amount of charge transferred is a function of the type and concentration of precipitation particles, aircraft frontal area, and aircraft velocity. A C-5 flying fast through heavy precipitation will usually build up a charge quicker than a C-21 slowed to approach speed in light rain. So what's so important about being near the freezing level? The most intense electrical charging mechanisms exist in this region due to its mixture of ice crystals and supercooled water droplets. Furthermore, as supercooled droplets become more highly charged at the freezing level, they may break into even more numerous smaller droplets, thus enhancing the triboelectric process. Still with us? Note that thermal activity associated with water changing state at the freezing level may contribute to the turbulence often accompanying discharges.

If all this electrical potential is at the freezing level in innocent looking rain clouds, why is there no natural lightning? Good question! Here we deal with theory. First, for lightning to occur, charged areas need to separate. In rain showers, large charged regions don't form until aircraft come flying through. Not only is your aircraft accumulating a large negative charge from impacting cloud droplets and precipitation, the turbulence created in its wake may intensify the charge exchange process. Although Clifford's explanation is complex, it essentially says aircraft enhance charge separation until a discharge is triggered. Whether you want to call this a lightning strike or static discharge, it really doesn't matter.

So where does St. Elmo's fire fit into the process? St. Elmo's fire is also called corona and occurs when charge sufficient to exceed the breakdown strength of air builds on the sharpest points of the aircraft. Air breakdown strength is its resistance to electrical arcing and decreases with altitude. Corona will typically form around the aircraft nose and, besides being visible to the crew,

may cause radio static.

Does the presence of St. Elmo's fire mean you'd better get ready for a strike? Well, not necessarily. Although you may be on the verge of a rapid discharge, electrical exchange to the air by corona reduces the charge on the aircraft. As long as corona releases charge from the aircraft at least as fast as it builds up, all is okay. However, triboelectric charging can exceed corona's ability to "vent" the charge. The aircraft then becomes a region of charge build-up and a discharge similar to lightning occurs.

Looking at a sample of MAC mishaps reported as lightning strikes, in almost every case events and conditions reported by crews fit Clifford's static discharge scenario. The following narrative from a recent C-130 mishap report is typical:

"Shortly after level off, aircraft entered clouds and was experiencing moderate precipitation along with light to moderate turbulence (OAT + 5 degrees C) when the strike occured. Aircrew saw a flash and heard a light buzz but wasn't certain a strike had occurred. . . Post flight inspection revealed a burn hole approximately 2 inches in diameter near the center of the aircraft radome."

Another C-130 crew reports similar events and conditions:

"As the descent began, we encountered heavy precipitation. Passing through 12,000 ft, a single lightning flash was observed and appeared to have struck the aircraft. All systems continued to operate normally. The aircraft wasn't deviating at the time of the mishap nor was the radar showing any areas of activity. Thunderstorms weren't reported or forecast for this phase of flight. At the time of the strike, the aircraft was passing through the freezing level. After landing, a single 1/16 inch hole was found in the radome."

Summarizing 12 mishaps involving C-5, C-141, C-130, and C-21 aircraft, these conditions seem to accompany static discharges to MAC aircraft:

- Aircraft had just entered precipitation, usually described as moderate to heavy, or increasing in intensity.
- Aircraft were near the freezing level. Mishaps reviewed documented OATs between +9 and -2 degrees Celsius.
- Aircraft were in light turbulence.
- The radome is almost always included in damage reports.
- Aircraft weren't near thunderstorm activity and the clouds they were in didn't appear hazardous, either visually or on radar.
- The flash was accompanied by a loud bang.
- Crews weren't always sure they were struck and damage wasn't usually evident until postflight inspection.
- Most crews didn't report St. Elmo's fire, and those that did, reported it after the discharge. Obviously, these reports may be influenced by time of day as St. Elmo's fire is easier to see at night.

Although static discharges to MAC helicopters are rare, they're not impossible. Many years ago an HH-53 was damaged when its rotor blades were struck. As in fixed wing mishaps, there were no thunderstorms in the area.

This discussion isn't meant to imply we're only susceptible to aircraft-triggered static discharges. Natural lightning strikes do occur. The Air Force, NASA, and FAA conducted considerable aircraft lightning strike research by intentionally flying highly instrumented aircraft in the vicinity of thunderstorms. Their results show conditions likely to cause lightning strikes differ from those we in MAC generally encounter during a static discharge. These tests demonstrate probability of natural lightning attachment increases with altitude up to about 35,000 ft and at temperatures below -40 degrees Celsius. Test results, though, are probably influenced by how data is collected. NASA obtained data by intentionally penetrating thunderstorms—a maneuver most MAC crews shy away from.

Considering MAC's history of electrical discharge mishaps, conditions leading to incidents fit scenarios described by Clifford. Naturally initiated lightning strikes in the vicinity of thunderstorms don't pose as great of a hazard to MAC aircraft. This isn't because they're not potentially dangerous, but because they're usually easy to avoid by giving thunderstorms a wide berth using MACR 55-series guidance and good sense.

Avoiding static discharges is harder because they occur in weather that appears safe to penetrate. Looking at weather conditions MAC mishaps have in common, you must wonder how to avoid electrical discharges when the only way to a landing is descent through an undercast near the freezing level.

In conclusion, now that you have an idea about what conditions generate discharges, a course deviation might be a good idea when given an available flight path around rain showers near the freezing level. Although not "bolts out of the blue," lightning strikes do seem to come out of nowhere, or at least not from where we usually expect them.

Technical assistance obtained from 1st Lt Danny L. Sims, HQ AWS/DNXP.

Reference: Clifford, D. W., "Another Look at Aircraft-Triggered Lightning," Lightning Technology, NASA Conference Publication 2128, (FAA-RD-80-30, 1980) pp. 395-416.

Ready, Willing, and Able

DOVER AI
The 436th

By Capt. Dan Do
Associate Edi

(Editor's Comment. This article is the first installment of a new *TMF* series covering the MAC mission. We've started with 21st Air Force, and future editions will carry similar stories about its units, eventually featuring the headquarters itself. After that, we'll move smartly out to cover the 22d and 23d. What we're looking for, is a broad brush view of the mission, and most importantly, how it's done safely. We hope you enjoy. Look for us on your base.)

Aggressive Safety Spoken Here!

Tower and Terminal

Nestled in the heart of the Delmarva Peninsula, The Land of Pleasant Living, as it's known, is a relatively small Air Force Base flying the free world's largest airplane. Between feasts of steamed crabs and Chincoteague oysters, the men and women of the 436th Military Airlift Wing operate the largest (military or commercial) port on the east coast and deliver the goods in an airborne Ramada Inn to the rest of the world. And they do it while adhering to their wing's motto; they practice *Aggressive Safety*.

I visited Dover last January as a guest of Maj. Gordy Minner, Chief of Safety; and in two days, my wing safety staff tour guides, Maj. Mike Bell and SMSgt. Fred Smith proved the wing motto is indeed practiced. In 48 short hours, I met and spoke freely with whomever I could find in offices, briefing rooms, or anywhere else. I started each interview with a couple of questions and then took copious notes—lots of notes. Everyone had plenty to say, and a gracious plenty of what they said fell into the categories of pride, enthusiasm, and a great deal of professionalism in their approach to their mission.

My questions were hand-scribed on a steno sheet on the left side of my notebook. This is important, because it meant I always asked the same question first: What makes Dover different? After the first five or so identical answers, I was no longer surprised when everyone else also gave the same response—birds.

While Dover is situated in the middle of a natural bird sanctuary and wintering home for several large Canadian citizen birds like geese, ducks, and swans—fact is, other bases were also built in the middle of flyways. I broke the code as to why Dover is different by the end of the first day. The reason everyone's first response is always "birds," is because of the extreme efforts the wing folks make to impress this hazard on their crews. Even though it happened over five years ago, all remembered, as if it was yesterday, when a fully-loaded Galaxy took off in lousy weather and collided with about a hundred snow geese at less than 100 ft AGL. Besides extensive surface skin damage, the birds trashed two engines. In a fantastic feat of airmanship, the crew brought their crippled plane around for an uneventful instrument landing. Everyone I spoke to knew the story. Everyone takes this threat very seriously, especially the wing safety shop. Two quick examples of their enthusiasm: (1) They've discovered sunrise and sunset are prime goose launch times. As a result, Dover schedules departures and arrivals around it. (2) One radar screen in approach control is adjusted and devoted to calling *flock* traffic. Another tried and proven effective method, is putting a loud speaker on a truck, driving it out to the departure/arrival end of the runways and playing a wounded goose tape. They've also used shotguns, bells, and a host of other methods to prevent another catastrophe.

Another common answer to the question of what makes Dover different was "weather." The Eastern Shore, as it's referred to

AIR FORCE BASE, 6th Military Airlift Wing

t. Dan Dougherty
ociate Editor

East Coast's Largest Volume Port

in this region, is subject to always peculiar maritime meteorological influences. The Chesapeake Bay insulates Dover from most severe east coast winter storms, but dampness in the air makes low ceilings and visibility a fairly common occurrence. In fact, according to the Air Weather Service climatic weather brief, Dover suffers an average 210 days a year with less than 3,000 ft ceilings and/or 3 mi visibility. Worse yet, the period between November and May experiences an average of 87 days where ceiling and visibility is less than 1000 and 2.

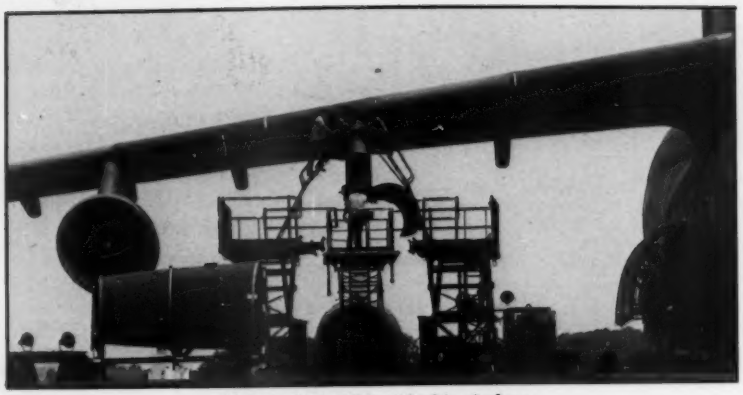
One crewmember called the weather unpredictable but generally, that's not exactly accurate. Conditions can be forecast as favorable for fog, but when you depart Mildenhall for home drome, and Dover's weather is clear, one just isn't emotionally ready to handle the news, an hour out, that temperature just dropped 2 degrees and visibility is RVR of 800. Complacency or a minor case of get-home-itis can cost plenty with this destination.

Another factor that makes Dover different is its geographic location. (Now before you think this is obvious, naturally its location makes it different. If it was located somewhere else, it wouldn't be different anymore.) What I mean is its proximity to other locations, like Washington, Norfolk, and the European, Mediterranean, Caribbean, African, South and Central American theaters. For example, Dover is the primary C-5 provider for VOLANT BANNER and SILVER missions. If you've never heard of these, they're worldwide airlift support missions for Presidential and Vice Presidential movements. Talk about high level visibility. More attention than this occurs just because Dover is the primary overseas arrival/departure point for some of our nation's highest level civilian and military leaders. The "red carpet" stays out, along with their matching hospitality.

No one who's been there would argue against the fact that Dover's theater of operations can provide some of the most varied, busy, and out-of-the-way destination aerodromes the world has to offer. But before you jump to a "so what" response, look at the monster they're flying. That was the second question I asked—what's different about the C-5?

Without fail, each person smiled in disbelief that I would even ask it, and reply *"size."* After that, answers varied as to what it was about the size that made the Galaxy different. Taxiing this beast was foremost on every pilot's mind. All with whom I spoke were experts in wing tip growth phenomena. This presents a major taxi problem for any of MAC's swept wing jocks, and those that marshal them. You see, because a swept wing aircraft's pivot point is displaced during a maximum effort turn (aft bogies castered/assymmetric power) the wing and tail sections swing out like a whip. The false perception occurs because you think in terms of the way an automobile turns. The pivot point is somewhere centered under the vehicle's frame, you look at a C-5 and think the fuselage will do the same thing; so if the obstruction is as far from the fuselage as the wing's length, then turning away from the obstruction will surely guarantee a safe miss. But in the C-5, the pivot point is actually somewhere between engines 1 and 2 for lefthand turns, and 3 and 4 for righthand turns. In a nutshell, the obstruction, at a minimum, has to be center fuselage to wingtip plus 25 ft, *PLUS* the distance from the pivot point to the center fuselage on the opposite side. That's my best explanation. Believe me, the Dover pilots know it well.

Picture doing these mental



Always think BIG with this airplane

gymnastics at night, on a strange field, with foreign marshallers; and then, take into account the fact your depth perception can discern depth from only 20 to 25 feet. The Galaxy's wing extends 111 ft beyond the fuselage centerline—and you can't even see it from the flight deck!!! Beyond 25 ft, this perception is a learned response, and Dover's crews are studying hard.

Size also is a major planning factor. Try some of these numbers on for size. There are 35 ft from the left outboard main tire to the right outboard main, compared to a little over 14 ft for a C-130. Maximum ramp weight is 772,000 pounds, and the airplane holds over 51,000 gallons of JP-4 (amount alone waters some eyes, pumping rate is another). If you don't think these are significant planning factors, imagine what kind of equipment you'd need and how many gallons of fluid it would take to deice it!

Another capability that makes this enormous airlifter unique is the neat tricks it can do to promote on/offload. The visor opens, the tail doors open, it can squat, it can kneel; and when it breaks, it's broke. Maintaining it is a tough job, and Dover's maintenance and supply folks are up to it, and they're up to it all the time. All of these planning factors tie into "normal" operations of the largest airplane; what about "abnormal" operations?

Gee Whiz Galaxy Facts

1. The C-5 is capable of airlifting in excess of 250,000 pounds of cargo and 75 troops at a speed of 480 knots. With inflight refueling capability, range is unlimited.
2. The cargo compartment is adaptable to transportation of personnel and can accommodate 270 troops. When added to troop and crew compartment capacity, the Galaxy can haul 366 persons.
3. C-5 Numbers:

Length:	247.8 ft
Height:	65.1 ft
Wing Span:	222.8 ft
Maximum Ramp Weight:	772,000 lbs
Maximum Fuel Weight:	332,500 lbs
Cargo Compartment:	144.6L x 13.5H x 19W

(Total Volume 34,734 cu ft)

Number of Wheels 28 (4 nose/ 6 each on 4 main gear bogies)

I covered this area with my third question. What special or unique challenges affect Dover and the C-5? Several responded that the biggest challenge is getting the C-5 into the air; once there, it flies like a dream. One aircraft commander said his job was similar to being the "mayor of a small city, the hard part is getting launched."

Wing modifications to the A model were completed last year, and the fleet is operating unrestricted. This means the C-5 is operating at much greater weights than most local expertise has ever experienced. Engine performance is becoming more critical, as is other performance data and techniques for heavyweight operations. Flight crews have to pay a lot closer attention to this area. Furthermore, as users learn this craft's immense capabilities, safety, and reliability, the mission is evolving to where they're landing at more strange places than ever before. Airlift Control Elements are dealing with C-5 size problems, and crews are confronted more and more with hazardous ground operations situations.

Were normal operations into unusual situations not bad enough, the wing's folks also cope with the inception of a C-5 Combat Aircrew Training Program (CATS). With help from the CATS school at Nellis, and in close coordination with their sister wing at Travis, and HQ MAC, Dover developed and operates an ambitious CATS qualification training program. Yes, the mighty Galaxy is doing it in the weeds! And they're doing it safely and with pride.

One of the most serious hazards confronting supervisors today is the exodus of prime experience. I'm not talking only about the airlines; there are also

retirements and normal rotations that drain quality expertise from this complex weapon system. Local leadership is taking steps to soften this problem at their level with a giant step toward safety. Budgetary reductions have taken a toll in the C-5 flying-hour program. This fact translates into an "experience aging" shortfall that'll require most careful pilot scheduling. Some steps, already in place, are full crew briefings, day-before planning, and scheduling a minimum of two copilots on missions.

That last step leads to the final challenge several individuals addressed which most certainly requires careful handling—that's crew size. Picture three pilots, two flight engineers, five loadmasters, two crew chiefs, three security police, sprinkle in one or two flight examiners, and you get a crew that's so large the aircraft commander can easily lose the close interface required to safely operate the machine. One aircraft commander I spoke with had 32 crewmembers on his initial line check! There's only one prevention measure keeping this challenge from being a hazard, and that's highest quality aircraft commandership. Look at their fiscal year 1987 sortie count of 6,225 logged in 26,805 flight hours without a Class A mishap, and you'll agree they've stepped up to this challenge.

In two days, I couldn't see everything nor talk to everybody. But I noted strong examples of unit pride among Dover's personnel. Their safety program is effective and constantly ongoing. Crews are professional and conservative. They praise their leadership for their support. As one officer described it, "The leadership backs you first, rather than accuse you." Overall, the wing lives up to its own motto, and indeed practices AGGRESSIVE SAFETY!

Class IV Modifications

Dover and the rest of the C-5 community have two approved Class IV modifications that'll bring the 19-year-old A-model up to B-model reliability standards.

TCTO 1C-5A-1984: Main Landing Gear (MLG) Actuation System Replacement

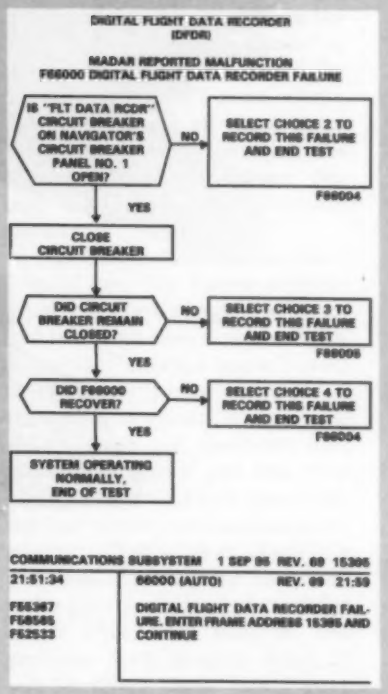
The current A-model MLG system has experienced failures resulting in severe damage to airframe structure, gear doors, and fuselage. You remember the joke about what's wrong when you see three C-5s parked, and two of them are on jacks? The answer is the station only owns two sets of jacks. But before long, those of us remembering this joke will be showing our age, as this modification reduces the number of actuators/gearboxes from ten to two, and replaces torque tubes with push-pull rods. Us "little MACers" will have to invent some new "Fat Albert" jokes.

The modification is currently installed on a prototype for testing and will start around Jun 89, and be completed by mid-1992. Cost is over $84 million.

Installation of C-5B MADARS II and Avionics

The Malfunction, Detection, Analysis, and Recording System is one of the thoroughly "nifty" devices that make the C-5 a true Cadillac of airlifters. It literally spots a problem, displays it on a screen at the flight engineer's station, and provides a trouble-shooting chart to fix it (See Figure 1). The MADARS I, found in the A-models, was on the leading edge of early 60s technology; MADARS II incorporates the explosion of technology that has occurred since. With this mod, several other dated electronic components will also be replaced. Again, this mod shares the goal of bringing the A-model up to B-model high reliability standards. This modification incorporates the following changes to significantly improve the C-5A's reliability and maintainability:

- Replaces the C-5A MADARS I with the C- 5B MADARS II.
- Replaces the C-5A ejectable crash data position indicator recorder (CDPIR) system with the C-5B flight incident recorder system (FIRS).


DIGITAL FLIGHT DATA RECORDER (DFDR)
MADAR REPORTED MALFUNCTION
F66000 DIGITAL FLIGHT DATA RECORDER FAILURE
IS "FLT DATA RCDR" CIRCUIT BREAKER ON NAVIGATOR'S CIRCUIT BREAKER PANEL NO. 1 OPEN?
NO
SELECT CHOICE 2 TO RECORD THIS FAILURE AND END TEST
F66004
YES
CLOSE CIRCUIT BREAKER
DID CIRCUIT BREAKER REMAIN CLOSED?
NO
SELECT CHOICE 3 TO RECORD THIS FAILURE AND END TEST
F66006
YES
DID F66000 RECOVER?
NO
SELECT CHOICE 4 TO RECORD THIS FAILURE AND END TEST
F66004
YES
SYSTEM OPERATING NORMALLY, END OF TEST
COMMUNICATIONS SUBSYSTEM 1 SEP 86 REV. 09 15305
21:51:34
66000 (AUTO)
REV. 09 21:59
F56387
F58585
F62533
DIGITAL FLIGHT DATA RECORDER FAILURE. ENTER FRAME ADDRESS 16385 AND CONTINUE

Illustrated MADAR II Malfunction Display

- Installs C-5B configured:
  - Avionics racks in bays 1, 2, 3, and 4.
  - Navigator's circuit breaker panels.
  - Interphone system.
- Replaces C-5A accelerometers with C-5B 3-axis accelerometer.
- Removes the Peripheral Command Indicator.
- Installs C-5B configured center console.
- Installs C-5B configured avionics cooling system.
- Replaces all 26 gauge wire associated with avionics in the forward fuselage with 22 gauge or larger wire.

Expect this mod to begin in mid-89, and be completed in early 92. The price tag is $166 million.

Dover is home for the only all-C-5 equipped wing in MAC and the largest and busiest aerial port facility on the east coast. In FY 87, the 436 MAW tallied up the following workload:

Air Passengers Processed	135,164
Air Cargo Handled (Tons)	117,942
Aircraft Handled	12,330
Surface Passengers Handled	10,470
Surface Cargo Handled (Tons)	31,336
Personal Property Processed (Tons)	18,225

There'll Be Plenty of Time

How quickly we forget . . .

1987 MAC Flight Safety Writing Contest Honorable Mention

By 1st Lt. Edward B. Westermann
48 ARRS, Homestead AFB, Florida

Staring at my half-completed written test, I realized how long it'd been since I really hit the books. The new squadron Chief of DOV had surprised everyone with a no-notice test at that afternoon's aircrew meeting.

"Geez," I complained, "it's Friday afternoon and this test is burning 'bar time.' Besides, the ASET was through here only six months ago."

I drew a complete blank on the first three questions—this guy must be a real stickler for the regs. The questions were all "fill in the blank;" not a "multiple choice" in the bunch. Heck, I'd know the answer—if I saw it. I mean, what's the use knowing all those numbers? That's why they put the colored tape on the gauges. Nobody I know ever had a hot start anyway.

As I looked around the room I could see the young copilots rapidly going through the exam, and two were even finished. With over 500 IP hours, I know I could teach these "junior birdmen" a thing or two about flying. These guys always ask questions like, "What happens if you lose your main inverter while your non essential bus switch is in the normal position?" That's what checklists were made for. Anyway, there's always plenty of time to read the Dash One and analyze the problem. And another thing: If you let them, these young guys will give you a departure brief rivaling Hamlet's soliloquy. I mean they'll even brief a specific landing spot for an engine failure on takeoff. Regardless of wind conditions and obstructions, I know I'd be able to spot an opening and put her down safely if the time ever came—but I don't need to take up intercom time with a lot of talk.

These new guys all seem to be a bunch of egghead engineers. Every Wednesday they conduct a Dash One discussion session. I'm pretty sure the stimulating content would be readily embraced by the American Narcoleptic Society. Talk about boring! I went to one where everyone spent 30 minutes talking about tail rotor problems. Those guys didn't have a good war story among them. I kept trying

"Heck, I'd know the answer if I saw it."

Lt Westermann, a 1984 USAF Academy graduate, has over 800 flight hours in TF-1F, HH-1H, and UH-1N.

to explain, "It's all in the hands—the aircraft nose will turn in one direction or another and then a good pilot can react and keep it under control." They were looking for rules such as, "the aircraft nose will follow throttle direction" or, "use collective first, then throttle, for nose alignment during an approach with left pedal stuck forward." It was almost as if they were trying to memorize the emergency procedures section. Brother! What a waste of time!

Going cross-country with one of these guys is quite an experience as well. I thought the weather briefing would never end after my copilot noted a 500-foot scattered deck forecast at our destination. His suggestion to plan for an alternate "just in case" worked out pretty well when our destination went to an unforecast 300-foot overcast. But regardless, there would have been plenty of time to contact Metro en route and find another field. So, flying the localizer into our alternate, I didn't break out at minimums. This kid brought us in on the second one—after seeing all my corrections. Heck, had I watched the first one, I could have landed it too!

Anyway, instrument flying is egghead flying. Tactical flying is what it's all about. That copilot even said something when I dropped down to 300 ft on a beach run. He mentioned the "500-foot minimum altitude except in pre-surveyed low-level areas." I'd logged time at 50 ft while he was still in diapers! Besides, you can't really see the scenery until you're below 200 feet. He even talked about a noise abatement area listed in the Class II NOTAMS. Really! I didn't think people read those. Anyway, people who submit noise complaints are cranks with nothing better to do.

I thought he might loosen up after a couple of beers at the O'Club but, at 2100 hours, he stopped drinking on account of our scheduled 0700 brief. I tried to explain that, on cross country flights, the rules were made to be bent, if not broken. Not even the old trick of setting my wristwatch back a couple of hours could get this guy to relax. Well, needless to say, I was ready to head back to home station when this "Mac MacKenzie" clone suggested we fly VICTOR airways for a little more training. I tried to tell him that VFR with a tailwind is the next best thing to a bar, a beer, and someone to share it with.

Well, now the group in the briefing room is beginning to thin and I continue to stare at my half-finished test. Let's see, here's a question about new lost wingman procedures. The old procedures worked just fine, but it's typical of headquarters to fix something that isn't broken. Oh well, I'm Number 2 for my formation flight next week so lead should brief the new stuff. Anyway, there'll be time to brush up on the new procedures the morning of the flight.

I pencil in my last answer and prepare for the worst as I hand in my test for grading. The growing trickle of red ink, followed by the "45" at the top of the paper, tells me what I already know.

Rummaging through desk drawers in search of my car keys I come across an old manila folder. As I open the folder, I recognize the now-yellowed aircrew tests I'd taken years ago as a new copilot. They all show neatly written 100s across the top. With the realization the bar will still be open next week, I reach for my Dash One . . . *"Now where is that section on main inverter failure?"*

(Author's Comments:) It's often said one's integrity isn't lost all at once, but by inches. Perhaps then, safety consciousness also slips away by degrees—if left untested.

Gamesmanship

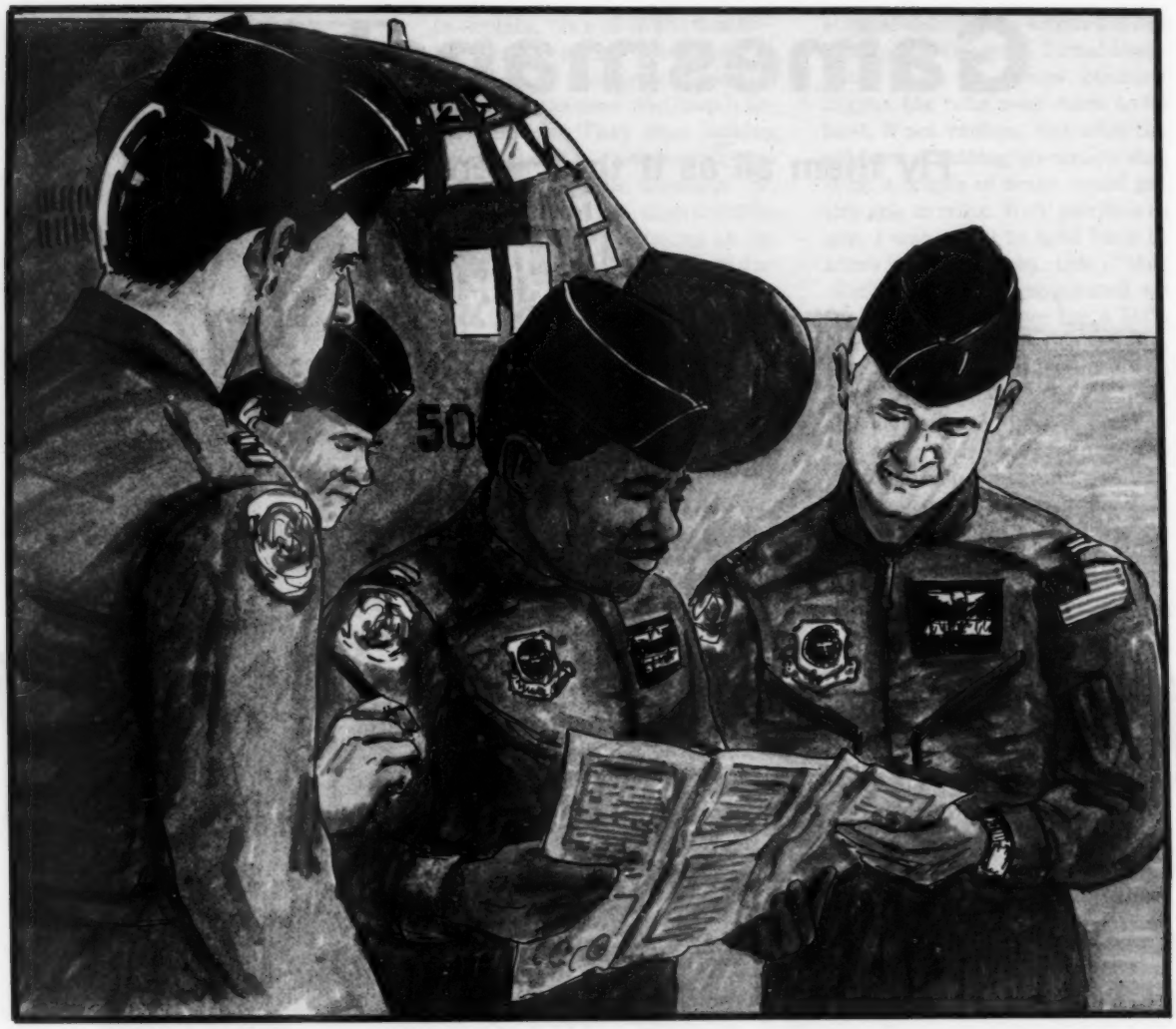
Fly them all as if they were checks!

It'll be parts plus 3, sir;" the C-130 line chief said, "Do you want to hold on?"

Mac MacKenzie took a deep breath, sighed, and quickly calculated 3-hours plus present, minus start, taxi, and runup would give him 23-minutes prior to burn out. If something else were to delay, a 30-minute extension was also a possibility. Crew rest shouldn't be too much of a factor as it was a 0700 show, 2½ hours for brief, plus this 3-hour delay would mean about a 1230 takeoff for a 5-hour flight; it should work!

"Yeah, we'll wait it out," Mac told the maintenance line chief. "Okay guys, let's go on to the snack bar and talk flying."

Mac was performing instructor aircraft commander duties for this local pro sortie. His pilot crew was made up of three second lieutenants, out for their monthly bounce and gos. At the snack bar, the four crowded into a booth with the expressed purpose of talking shop. The break on the airplane was such that Mac thought 3 hours was pretty ambitious; and the old "parts plus" call always made him wonder about the



obvious unknown—how long would it take to get the parts? So, he was committed to at least get some quality training for the others, since he really felt burnout was the most realistic possibility.

"Well, anybody got anything they wanna talk about?"

"Yes sir," one lieutenant quickly replied, "I've got an annual qual check coming up, and I'm about as scared as I always get. I've got a really bad case of checkitis, and I've heard of something called 'checkride gamesmanship.' Can you tell us the rules?"

Mac smiled, "Yeah I've heard of it. In fact, I used to practically break into hives at the thought of a checkride, and still don't relax when I get one. I've also heard of gamesmanship; unfortunately, I didn't learn what it *really* was until I became a flight examiner back in the wing. Hey guys, gamesmanship is simply another word for thorough preparation and a continual professional approach to your aviating *profession*. But, let me see if I can tell you about gamesmanship as a list of rules. I don't think there'll be too many. Bill, you have the flight orders; how about writing them down as we go?"

"No problem sir."

"Okay, I guess the first one would be—*who's the flight examiner*? Be it squadron, wing, NAF, or MAC, most of them put out some type of newsletter or FCIF. Pay particular attention to

the special interest items. Ask about them or about upcoming reg changes, put the examiner in the answer mode. Remember, a major responsibility they have is standardization. Asking 'intelligent,' probing questions will make you that much smarter.

"Be extremely cautious of nonstandard techniques. I once had an instructor who told me never, never, NEVER feather a prop while in a turn. He didn't really explain why, or if he did, I forgot; but I sure remembered never to feather in a turn. Well, that technique cost me a Q-3 for 'hesitation' in boldface while I let an engine BURN, simulated of course, to avoid getting dinged for feathering in a turn. Be curious of old adages, spiffy techniques, and any other nonstandard stuff you're told.

"Plan your checkride. Annual qual, instrument, OME, and SME checkride requirements are established in the regulation. The maneuvers aren't secret, and you're welcome to your own copy of the MAC Form 4 anytime. Let me give you a couple of examples: the annual qualification check requires both a three-engine go-around and landing. You've been on enough locals to know that probably, during your first simulated whatever, a firetruck or something will enter the runway. Yet you'd be surprised at the number of pilots I've seen thrown completely off guard by that announcement! That's not to say your preparation for the three-engine go should affect your approach either. I'm assuming you have the approach well under control, and you're thinking of a 'Flaps 50' call.

Another example is the annual instrument check. You probably already know you'll need entry and holding, two nonprecision, two precision, and a circling approach. You probably have a good idea where the checkride will take place. Now take those two pieces of information and build your own profile. Chair-fly those maneuvers beforehand; the day before, get a weather forecast so you can anticipate those items also, plan the wind effects for holding, et-cetera. Naturally, the best laid plans can go awry, but I can guarantee this type of preparation pays dividends in many other ways.

If somebody is going to bust, they'll do it by themselves.

"Do your homework. As in the instrument example, be very sensitive to what's happening around your flying world. What're the weather patterns, what taxiways are closed, what does the new ops supplement really mean, what's new in the FCIF, and so forth. Key in on these storytellers, not knowing about them can really get you into trouble, and not only on your checkride. Getting all this down, Bill?"

"Yes sir. Most of it's pretty obvious so far, nothing too cosmic about it, I've just never thought about doing it."

Brad agreed with a smile and a nod. "Yeah, I know how you feel. You want to slap yourself on the forehead during the check when you realize you could've figured it out yesterday! My next rule's gonna sound pretty obvious too—*dress for it.* Now you may think this one sounds a little silly, but if you don't believe clothes make the man, look at some of the people you admire most, and then note how they look. You shouldn't be in uniform without shined shoes and a proper haircut; yet, some crewmembers are always stretching the limits on their appearance. Don't do that!

"Those are some of the things you can and should do before the big day. Now I'll shift into what you need to do during the ride."

One of the lieutenants said, "It's funny, but already I see where I'd feel a whole lot more comfortable during the ride were I to do what you've just mentioned. I bet this is the part where you're gonna give away all the secrets."

"Well," Mac said, "I think you'll find there are really no 'super top secret' tips here either. Take for example the next rule—*build a good nest.* Take the time to get everything ready. Do a thorough crew position preflight. Instruments, oxygen mask, publications, comm radios—you know the routine. Don't short-change any step. You're going to be too busy to wait while someone gets you the low chart you forgot. Pull up all the comm buttons to the traffic controlling agencies, UHF and VHF both. This gives you two advantages: One, you can clear the airways by knowing what other aircraft are in your airspace and what their intentions are; and two, you'll be ready for simultaneous transmissions in event of an emergency.

"Another biggy, and this one you've got to carry out through the entire flight, is to *watch*

When it happens on a checkride, OH MY GOD! And even *He* can't help you through the mistakes you're about to make.

closely for task saturation. I can't tell you the number of times I've seen a good crew coordinator turn into a solo pilot when receiving a check. There seems to be an unwritten rule that when taking a check, you can't ask the rest of the crew for anything; and worse yet, the crew doesn't seem to want to help out either. Tell your crew straight out—I want to hear altitude calls, traffic advisories, and anything else during this flight.

"When it does get too busy to think straight, pause! It's not as difficult as you think. Do the same things you would do if it was a normal flight. Ask Center for holding, pass the flight controls, ask the flight examiner to hold that question for a moment while you work this problem out. Don't worry, he'll not only abide, but he won't forget to ask it later either.

"Whatever else you do, either right or wrong, always *correct your known mistakes in a professional manner.* This one is kind of a grey area. What if you have the wrong VOR dialed in? This example really depends on the circumstances, but say you spotted it while en route to the wrong station. Announce you've found it, and immediately ask Center for clearance for this 'new' airspace you're entering. Even then, I can't guarantee it'll save you. I busted my initial AC upgrade check that way. Before takeoff, we were cleared direct to a DME fix for two turns in holding. The fix was identified off a TACAN, but I had the VOR in my flight director as my briefed emergency return approach. Well, as one might expect, after a perfect takeoff and checklist operation, I went right into the holding briefing and never changed the flight director. The nav, bless his heart, called me three times with: 'Pilot, Nav, is it true the VOR and TACAN are not colocated?' He was really starting to bug me. Another thing I noticed out of the ordinary was the flight examiner's lips moving, but I didn't hear him speak. What he was doing was getting us airspace clearance (another reason to have all your comm buttons up!). I'm not bragging, but that was the only thing I did wrong on the check, the re-qual was limited. I used to wonder what the flight examiner would have done had the nav said: 'Pilot, you have the VOR dialed in.' But I don't wonder anymore; since I've given checks, I've heard these prompts from other crewmembers many times, and chalked them up to exceptional crew coordination. If somebody is going to bust, they'll do it by themselves.

"Whatever mistake you've made, correct it professionally, just as you would on any other flight. Ranting and raving 'Oh God! Oh God! I've busted, I've busted', is not cool. In fact, you've heard it before. Once you've made a mistake, press on—maybe the examiner didn't notice. Well, let me tell you, in most cases they have nothing better to do than watch your every move. This is true especially when standing, but even more so when flying, because examinees will rarely task the examiner; preferring that urge to fly solo again. Either way, the 'press on' advice is *good* advice. The examiner probably saw you do it; but even examiners make mistakes, so he's probably not holding the hit against you. What he's doing is waiting to see how you react, and correct your mistake. Those actions tell the most about your overall performance.

"While on this subject, however, avoid enlightening the flight examiner with a continuous running dissertation of your performance. Besides risking the possibility of missing something you should have heard or seen, I've seen it where the pilot did the right thing; then, in his dissertation, I discovered he did it for the wrong reason!

"If there are any 'secrets' I'm gonna reveal, it'll be this one—*key in on warning questions.* Whether you realize it or not, flight examiners send out warning shots before they 'fire-for-effect.' Many times, when examiners spot you doing something wrong, they'll ask you what you're doing. Here's what happened on a low-level eval I was administering to a copilot: He was doing an absolutely exceptional job maintaining course guidance and situational awareness, his chart was picture perfect, aircraft control was smooth and positive, then it happened. About 25 miles ahead, directly on our current heading and on our planned course, was a large, isolated thunderstorm completely obscuring a mountain range. I watched his eyes very carefully to see if he had seen the storm—he had. That's when I fired the opening volly, 'Copilot, Examiner Pilot.' I said, 'Are you satisfied with our current route of

flight?' He carefully studied the surrounding terrain and his chart several times, and said, 'Yes.' Let me tell you, that question should've set off alarms, sirens, and bells the likes of which would wake the dead, but he didn't hear them. So I asked him again, 'Copilot, Examiner, are you *sure* you're satisfied with this course?' If that didn't work, neither would a two by four! This time, he checked his chart even more fervently, even asked the nav to look; both agreed they were satisfied with the present heading. Well, the aircraft commander who was not receiving a check caught the drift and announced with certainty, 'I'm not flying into that thunderstorm!' Then turned the aircraft.

"Did he bust?" They all seemed to ask simultaneously.

"I'm not saying, but that's just one example. Whenever you get a question from the examiner such as: 'Are you satisfied. . . is this what you intend to do. . . are you going to. . . did you mean to . . . are you sure . . .' or anything else that sounds like they want a definitive explanation for an action—that's a warning shot. Don't answer it right away; look very hard; you've probably missed something.

"Now, say you've missed something and you know he's got you; my next rule is—*admit it when you don't know the right answer.* Nobody knows all there is to know about this airplane, the MAC regs, FARs, or any other subject you think we all ought to be familiar with. While this is true, there are some things all of us ought to know cold, like when to climb out of a low level route, when to discharge the fire bottle, or which decision height to select. When it comes time for question/silence, as it's called on a checkride, the examiner is probing your knowledge limits. He generally starts with items all of us should know; if you're whizzing them, questions will get progressively harder until he can finally ask one you don't know. Believe me, you can get yourself into a deadman's spin pretty quickly the moment you try to BS the examiner. If you don't know the answer, tell him you're not sure but know where to find it. I wouldn't want to rely on this answer too much though; you really ought to know the basics before the check.

"The final rule I can think of is a classic 'last but very much not least,' *you're in command until told otherwise.* I know you've all seen this one by now and not necessarily on a check ride. You're pretty sure you know the right thing to do, but lack the confidence to go through with it; you back off, someone else successfully does exactly what you would've done, and you feel like a fool. The same thing happens on checkrides. Most of us spend the entire time critiquing our actions in how we THINK the examiner's seeing them. It tends to make us very wishy-washy. Don't be pressured because the examiner's there. Flying with this way of thinking is placing your trust into an unknown, choosing so over your own good judgment; the classic 'doing something I've never done before' syndrome causes more Q-3s than any other reason. Interrupted checklists, closed taxiways, unusual ATC clearances—these are examples of normal things that happen all the time, and we manage to muddle through them without much thought. But when it happens on a checkride, OH MY GOD! And even *He* can't help you through the mistakes you're about to make.

"Take the time to do the job the way you know it's supposed to be done, and don't forget the paperwork. Continue through your checkride as if you were flying without the examiner. It's in the reg; he can take command of the flight at any point he thinks it's becoming unsafe. If he hasn't done that, you must be doing okay. Don't second guess his interpretation of your decisions, it takes too much time, and you're probably wrong anyway.

"Well Bill, how many does that make?"

"Eleven. Want me to read them?"

"Please."

"•Who's the flight examiner?
•Be extremely cautious of nonstandard techniques.
•Plan the checkride.
•Do homework.
•Dress for it.
•Build a good nest.
•Watch out for task saturation.
•Correct your mistakes in a professional manner.
•Key in on warning questions.
•Admit when you don't know the right answer.
•You're in command until told otherwise."

"Remember guys," Mac said, "Flight examiners are selected from the human race. And that's exactly what they are—humans. They've suffered through the same agony and turmoil you're experiencing. In fact, several I know used to get checkitis so bad it would have brought hives to mere mortals."

Just then somebody yelled from across the snack bar, "Hey, is there a Captain McKinky here? Phone!"

Mac returned and said "It's all over guys, ops picked off the airplane to back up the VOLANT BANNER this afternoon. Let's get a bus and get our things."

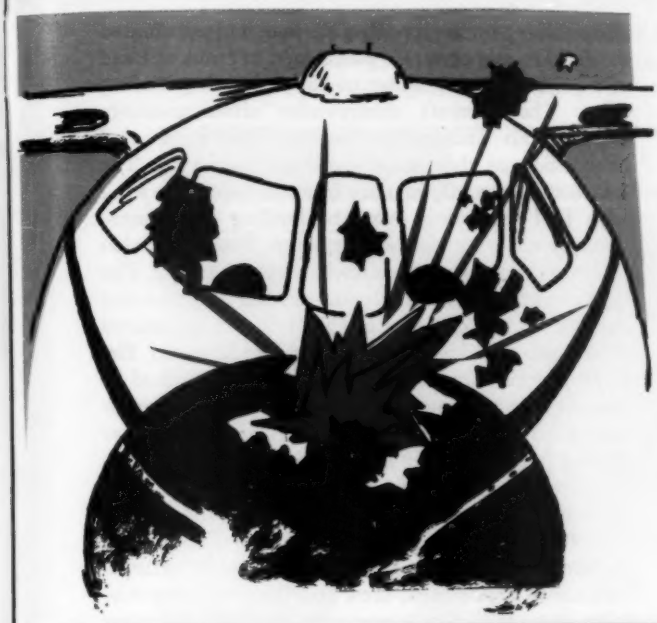
QUICKSTOPPERS

WATCH THE LIGHTS

The SAC -135 tanker crew was conducting their normal, thorough preflight when they found the number 2 engine T-handle fire light wouldn't illuminate when the fire test switch was activated. However, the bulbs did press to test normally. The electrical wizards checked the engine fire detectors and found no loose or separated wires. They then shorted a wire at the engine to see if the number 2 T-handle would light. But, lo and behold, when they shorted the wire, number 1 T-handle light glowed brightly. They then checked the number 1 engine, found a broken wire, shorted it, and number 2 T-handle light came to life. The fire detection circuit wires were crossed at the cockpit T-handles. As you can see, no detail, however small . . . .

AND WHERE THERE ARE FUMES . . . .

The C-130 crew was starting engines for an airlift mission when, after starting number 3 and 4 engines, the crew noticed a blue-white haze in the cockpit after the flight engineer opened the flight deck air conditioner valve. The AC immediately shut down engines, opened the swing windows, and ordered the overhead escape hatch opened. The haze rapidly dissipated. Estimated exposure time was 30 seconds. The crew returned to the squadron where the aircraft commander noted he felt weak and lightheaded. The flight surgeon examined all crewmembers. The aircraft commander and flight engineer, who also developed a headache, were restricted from flying for 24 hours. Remember, ANY fumes can be hazardous, even for very short periods.



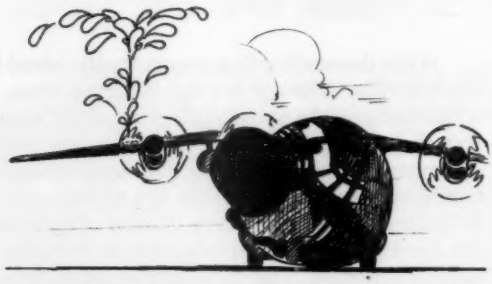
A SOCK ON THE NOSE

While descending to a remote Pacific island base, the Starlifter crew got a nasty surprise when, with a loud bang, pieces of the airplane's radome were seen flying past the copilot's window. The aircraft commander disengaged autopilot, deployed spoilers, retarded throttles, and slowed the airplane from 330 to 220 knots. The entire crew donned oxygen masks, but the airplane's pressurization system maintained normal pressure. The crew performed a controllability check and made an uneventful landing. The radome apparently failed inward for some undetermined reason. Let's see now, that Radome Failure Checklist is on page . . . .

WHERE THERE'S SMOKE . . . .

While relaxing at cruise in his trusty Navy C-9, the crew chief smelled what he believed was cigarette smoke. This struck him as somewhat out of place since all on board knew this was a *NO SMOKING* flight. Following his nose, he discovered smoke originating from the aft head (latrine for Air Force types). The head's only occupant adamantly denied he'd been smoking. The crew chief reported the matter to the individual's superior. During the next morning's preflight, the flight attendant discovered cigarette ashes in the aft sink and the head's smoke detector batteries disconnected. Watch out! People have died in airplane fires caused by just this kind of activity. Don't do it and don't let someone do it to you.

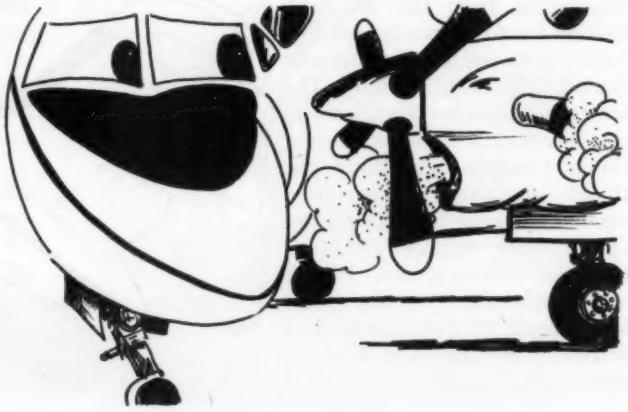
IT'S A GUSHER!



The C-130, leading a two-ship night tactical training flight, had just finished its runup and before-takeoff checklist when ground control requested both airplanes move as close as possible to one side of the taxiway to make room for emergency vehicles responding to an inbound, wounded fighter. As Lead began maneuvering to the taxiway's edge, Number 2 radioed Lead of a massive fuel leak on his right wing. Lead shut off all right side boost pumps in what turned out to be an unsuccessful attempt to stop the leak. Two crash vehicles, one of them a 1,500-gallon water tanker, spotted the leak and terminated his fighter response. He positioned in front of Lead and begin spraying water on the right wing leading edge. The aircraft commander simultaneously ordered an emergency engine shutdown and evacuation as the tanker continued spraying. The leak was apparently coming from the top of the wing with fuel cascading over the leading edge, some actually entering the leading edge. There was also fuel coming from the drainhole under the wing. The flight engineer and AC reentered the airplane and climbed on top of the wing. They found the source of the leak was the right outboard fuel filler cap. The flight engineer removed the cap and attempted to reseat the spring-loaded flapper valve in the adapter assembly. He could then see most of the fuel was coming from the assembly's vent hole so he tried to stop the flow with his finger until maintenance folks arrived. The cause was a possible design deficiency in the flapper valve assembly. Everyone's reaction to this emergency was a great example of situational awareness by the other crew and the crash response folks along with fearlessness by the flight engineer and aircraft commander. Good job!

OKAY, WHO DID IT?

There they were, starting the C-12's number 1 engine. The prop levers were returned to the full forward position after external power was removed, as you'd expect. The crew was somewhat puzzled however, when number 1 flamed out. Maintenance folks checked the engine and, finding no obvious discrepancies, recommended attempting a battery start. During this start, fuel flow fluctuated slightly around 100 pph, and the ITT rose to 400 degrees with RPM never rising above 30 percent. Shut 'er down! Suspecting fuel contamination, sumps were drained with no contamination apparent. Inadvertent shutdown with the condition lever was also a possibility, but soon rejected. No defects were found in pumps or connections, either. Hmmmm, what could it be? Ah ha! What's this? Number 1 firewall shutoff valve in the closed position. Well, now we know there's enough fuel in the lines to start the engine—good thing there wasn't enough to keep the engine running through liftoff.



After Deadlines

MAC'S CHIEFS OF SAFETY CONFERENCE, held 1 through 4 March 1988, provided the opportunity to exchange ideas, discuss problems and, hopefully, open communications channels between Headquarters and the folks in the field.

CONFERENCE ATTENDEES

WE'LL NEED ONE MORE--Editor, that is! We need someone to be a proud editor of the world's best flight safety magazine, *The MAC Flyer*. The job is exciting, challenging, and rewarding. When asked what you do for a living, your answer, "I'm an editor on *The MAC Flyer* " is received with an appreciative "Aaaaah!" We're looking for a major/captain with a strong desire to write. Flight safety experience, although not essential, is a plus. If interested, contact Major Tom Weinzierl, Supervising Editor, HQ MAC/IGFE, Scott AFB, Illinois, 62225-5101, or call AV 576-3534/5542.

386 tons of air machine